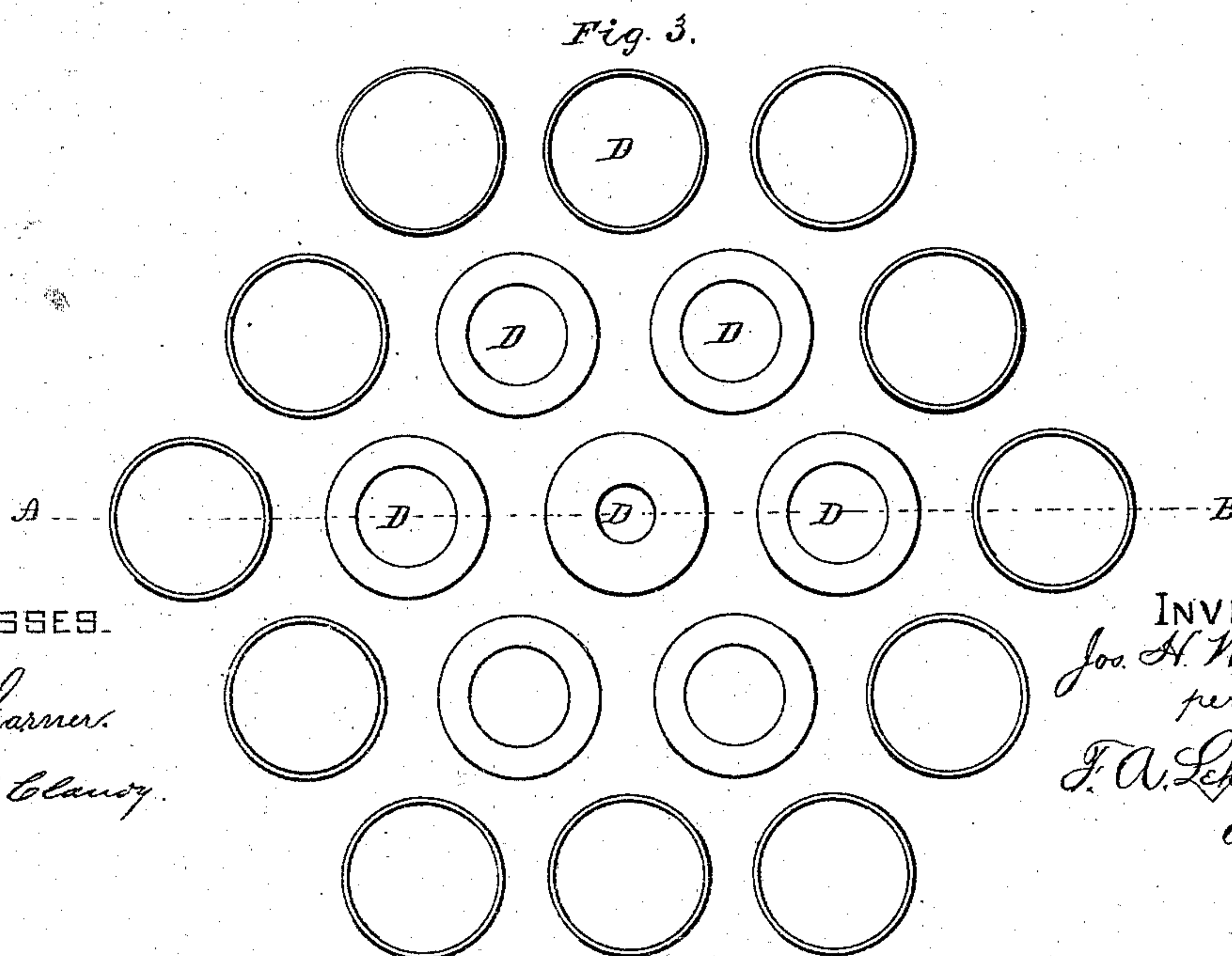
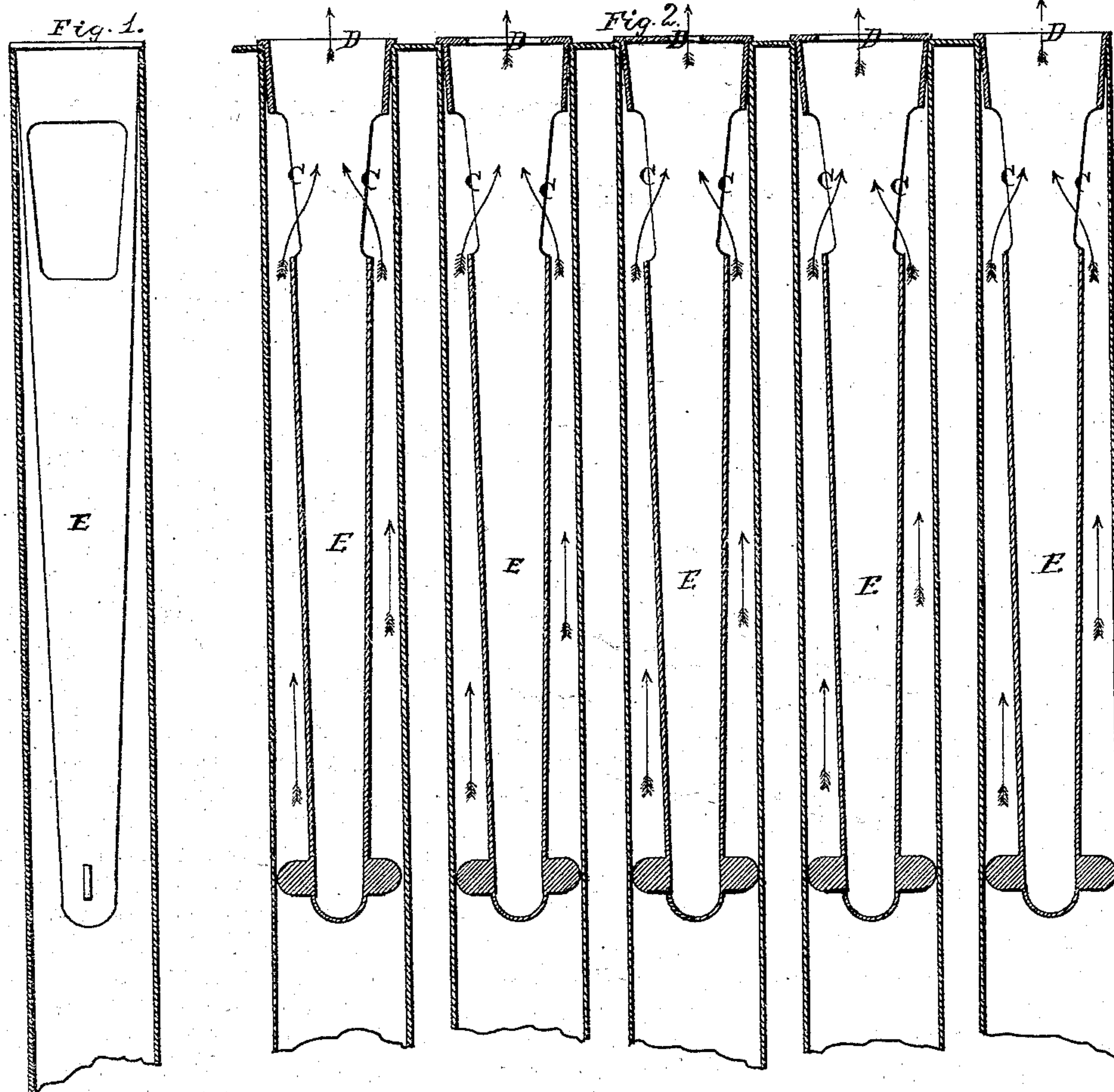


J. H. WILKINSON.
Fire-Tubes for Steam-Boilers.

No. 153,994.

Patented Aug. 11, 1874.



WITNESSES.

J. W. Garner.
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INVENTOR.

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UNITED STATES PATENT OFFICE.

JOSEPH H. WILKINSON, OF SOUTH NEWMARKET, NEW HAMPSHIRE.

IMPROVEMENT IN FIRE-TUBES FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **153,994**, dated August 11, 1874; application filed July 30, 1874.

To all whom it may concern:

Be it known that I, JOSEPH H. WILKINSON, of South Newmarket, in the county of Rockingham and State of New Hampshire, have invented certain new and useful Improvements in Fire-Tubes for Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

The invention relates to fire-tubes of steam-boilers; and it consists, first, in placing within the tubes of tubular boilers a central conical or straight core of a suitable length and shape, whereby the products of combustion are prevented from ascending in a central column through the center of the tube, but, instead, are caused to impinge on the tube and thus impart heat to the surrounding water; second, in graduating the exit-orifices of the tubes in such a manner as to lessen the power of the draft on the center tubes, and thus more evenly distribute the heat through all the tubes, and relieve the central tubes of the intense heat and unequal strain and wear and burning effect upon them.

The accompanying drawings represent my invention.

To explain the nature and purpose of this invention it may be necessary for me to state that one of the laws governing the action of flame and heated gases is their tendency to concentrate or column in the center as soon as they escape from the body of the fire. This concentrating or columning action I find to be positive even until the exit of the uptake is reached. It is especially so while passing through the tubes of vertical boilers, the column becoming gradually smaller, while the heated gases move with an increasing rapidity, if they have not given up their heat. The result is, that whereas the tube at the end where the flame or heated gases enter may be said to be filled with the gases by the time they have reached the exit end of the tube, they are passing off almost entirely in a central column, thus having little effect on the tube or its surrounding water. Another positive and injurious result attending the action

of the flame and heated gases in tubular boilers is, that when said gases pass through a series of tubes, say fifty or one hundred in number, arranged in the usual manner, a cluster of these tubes will receive nearly the whole amount of flames and heat emitted by the fire; and not only does this take place, but the gases are also drawn away from the walls of the flame-chamber. This cluster of tubes, (generally those in the center,) by being subjected to too severe and uneven a strain or impingement of the flame, become loose and burnt, and prove a fertile source of trouble.

To prevent the columning action of the flame and heated gases I construct and insert in the tube a central deflecting conical or straight core of a suitable length, made of cast-iron or other suitable refractory material, but preferably that of an increasing diameter toward the end farthest from the fire. By means of this device the columning is destroyed, and the heated gases are deflected and forced to travel between the core and the tube, whereby they are made to impinge on the tube with a comparatively uniform heat. This is apparent, for if the heated gases are forced to impinge on the surface of the tube their heat will be thereby absorbed, and their volume correspondingly diminished. This decrease in volume is provided for by the increased diameter of the deflector or core inserted within the tube or flue, and thus the above-mentioned uniform heat is obtained.

It will further be seen that while the core is hollow its lower end is closed, but the upper or exit end is provided with two or more ports, C C, through which the heated gases make their exit from the tube, and finally pass off through the graduated openings D D D. The effect of this arrangement is, that the volume of heat is made to more thoroughly impinge against the surface of the tube than it otherwise would if the heat were allowed to escape in the usual manner. It will also be seen that to guard against the central cluster of tubes receiving more than their quota of the heat emitted I reduce the exit D provided in the cores of those which are inserted in the central cluster of tubes, and thus the power of the draft is thereby equalized in all the tubes, the columning or concentrating of the

products of combustion is prevented, and a comparatively uniform amount of heat passes through all the tubes. By this means I utilize a tube-surface already provided, which, without my device, is of little use in the generation of steam, and at the same time I secure a more equal expansion and wear of the parts forming the interior portion of the boiler.

Having now fully described my invention, and given reasons therefor, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the tubes of tubular steam-boilers, of a central core or deflector running nearly the whole length of the tube, whereby the heat is made to impinge upon the inner surface of said tube, substantially as and for the purpose set forth.

2. The combination, with the tubes of tubular steam-boilers, of a central core or deflector, E, with its ports C C, substantially as and for the purposes set forth.

3. In a tubular boiler, the combination of the tubes with graduated exits, whereby the heat is equally distributed over all the tubes, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 29th day of July, 1874.

JOSEPH H. WILKINSON.

Witnesses:

F. A. LEHMANN,
FRANK CLAUDY.